

**REMARKS**

Claims 1-10, 12-21 and 23 are pending in the current application. Claims 1, 7, 8, 9 and 23 are in independent form. No new matter has been added. In view of the following remarks, favorable reconsideration and allowance of the present application is respectfully requested.

Initially, Applicants appreciate the Examiner's indication that the references submitted in the Information Disclosure Statement filed on March 14, 2008 have been considered.

I. **EXAMPLE EMBODIMENTS**

Conventionally, a water resin having an improved gel blocking property and a water resin having an improved liquid permeation/liquid diffusing property have been tried. However, a water absorbent resin wherein the gel blocking property and the liquid permeation/liquid diffusing property are simultaneously improved has not developed.

In order to produce a water absorbent resin composition which is superior in the gel blocking property and the liquid permeability/liquid diffusing property, example embodiments teach that "...it is necessary that surfaces of particles of the water absorbent resin are secondarily cross-linked evenly. When the surfaces of the particles are not secondarily cross-linked evenly, portions which are not secondarily cross-linked to each other are clumped, so that the blocking phenomenon occurs." Specification, pg. 8, ll. 8-15.

Thus, example embodiments in the instant application provide (i) a water absorbent resin composition that is free from any clump of particles even in high humidity, that exhibits superior absorbent properties (*e.g.*, an absorbency and a diffusing absorbency under pressure), and that has particles whose surfaces are secondarily cross-linked evenly, and (ii) a method for producing the water absorbent resin composition.

Further, the instant Specification states,

In terms of a superior absorbent property and a superior moisture absorption blocking property which suppresses clump of particles in high humidity, the inventors of the present invention earnestly studied a water absorbent resin. As a result of the earnest study, they found that: it is possible to achieve the foregoing object by giving the water absorbent resin (1) a specific cross-linking structure, (2) a specific particle size distribution, and (3) a metal component, and by arranging the water absorbent resin so that an extraction rate of a multivalent metal component is 5 wt % (wt %) or more and less than 100 wt %, thereby devising the present invention.

Specification, pg. 9, ll. 4-15.

Thus, example embodiments teach that improvement of both the moisture absorption blocking property and the liquid permeation/liquid diffusing property can be achieved with a specific cross-linked structure, a specific particle size distribution, and a specific extraction rate of multivalent metal.

## II. CITED ART GROUNDS OF REJECTION

(A) *Claims 1-4, 7-10, 12-21 and 23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Mertens et al. (hereinafter "Mertens"), WO*

00/53644 (U.S. equivalent is U.S. Patent No. 6,605,673). Applicants respectfully traverse the rejection.

i. INDEPENDENT CLAIM 1

Independent claim 1 is directed to a water absorbent resin composition wherein (*inter alia*) “the water absorbent resin composition contains 95 wt % or more of particles whose particle diameter is less than 850  $\mu\text{m}$  and not less than 106  $\mu\text{m}$ , and a weight average particle diameter of the particles is less than 500  $\mu\text{m}$  and not less than 300  $\mu\text{m}$ , and a logarithmic standard deviation ( $\sigma_z$ ) of a particle size distribution of the water absorbent resin composition is 0.45 or less, and a water-soluble component of the water absorbent composition is 35 wt % or less” and “an extraction rate of the multivalent metal component around a surface of said particulate water absorbent resin is 10.0 wt % or more and less than 70 wt %.” Applicants submit that the art cited in the rejection fails to teach, or suggest, the above features recited in independent claim 1.

a. EXAMPLE EMBODIMENTS

According to example embodiments, where the weight average particle diameter is less than 300  $\mu\text{m}$ , the moisture absorption blocking ratio is higher at the time of water absorption, such that the gel blocking is likely to occur.

According to example embodiments, where the logarithmic standard deviation ( $\sigma_z$ ) exceeds 0.45, the particle size distribution becomes too broad, it is difficult to obtain the desired moisture absorption blocking property and the desired liquid permeation/liquid diffusing property.

According to example embodiments, where the water-soluble component is more than 35 wt%, the water-soluble component elutes from the water absorbent resin at the time of water absorption, so that the water-soluble component serves as a binder between particles. As a result, the gel blocking is likely to occur.

According to example embodiments, where the multivalent metal component extraction rate is too high, the multivalent metal component cannot be evenly mixed on the surface of the water absorbent resin. While, in cases where the extraction rate of the multivalent metal component is less than 5.0 wt%, the multivalent metal component permeates the water absorbent resin. Thus, it is impossible to improve the moisture absorption blocking property so that the improvement corresponds to the amount of the multivalent metal component.

b. MERTENS

Mertens is directed to a powdery cross-linked absorbent polymer, a production method thereof, and usage thereof.

Mertens teaches that the powdered polymer product is constituted of "...0.01-5 wt.-%, relative to the polymer product, of at least one polyol as surface secondary crosslinking agent in the form of an aqueous solution" and "0.001-1.0 wt.-%, relative to the polymer product, of a cation in the form of an aqueous solution, and heated to a secondary crosslinking temperature of from 150 to 300°C." Mertens, col. 3, ll. 47-53. Thus, the absorbent polymer of Mertens is characterized by being coated with (i) 0.01 wt% to 5 wt% of polyol with respect to the polymer composition, and (ii) 0.001 wt% to 1.0 wt% of cation with respect to the polymer composition, wherein the coated resultant is heated at a secondary cross-linking temperature of 150°C to 300°C.

Mertens teaches that "[i]t was therefore the object of the present invention to provide superabsorbing polymers which, as a combination of properties, not only have high absorbing capacity under pressure but also the normally contrary properties of high retention capability and good permeability in combination..." Mertens, col. 3, ll. 11-16. That is, the above arrangement provides a super-absorbent polymer that exhibits not only a high absorbing ability under pressure, but also a high retaining ability (TB value) and favorable permeability (SFC value) both of which are characteristics generally opposite to the absorbing ability. Further, Mertens defines an amount of water, functioning as a solvent of polyol and cation, as being 1.0 wt% to 4 wt% with respect to the polymer composition.

However, Mertens is totally silent about the “moisture absorption blocking property” of the absorbent polymer. Furthermore, Applicants submit that, if the water absorbing ability (*e.g.*, the retaining ability (TB value) and the permeability (SFC value)) is relatively high, the absorption property causes also the water content in air to be absorbed. Thus, the water absorbent resin particles clump in high humidity. As such, a moisture absorption blocking phenomenon occurs wherein the water absorbent resin particles lose their fluidity as powder. Therefore, the handling property of the water absorbent resin particles drops significantly.

Thus, due to the “high retention capability and good permeability” of the absorbent polymer of Mertens, one would expect the handling property of the absorbent polymer to drop due to the moisture absorption blocking phenomenon caused by clumping in high humidity, contrary to example embodiments as discussed above.

Referring to Tables 2 and 4-7 of the instant application, Applicants note that each of the products of Examples 1 to 10 has a “moisture blocking ratio  $\alpha$ ” that is substantially lower and exhibits a better moisture blocking property than the products of Comparative Examples 1 to 17.

As explained in Applicants’ Response filed on February 28, 2008, Example 1 of Mertens corresponds to Comparative Example 4 of the instant application. Comparative Example 4 and other comparative examples demonstrate that some products exhibit high centrifugal

retention capacity (CRC) and high saline flow conductivity (SFC). Thus, in Example 1 of Mertens and Comparative Example 4 of the instant application, the “moisture absorption blocking ratio  $\alpha$ ” is substantially high, and thus do not exhibit a moisture blocking property as taught by example embodiments.

Applicants remind the Examiner of MPEP §716.02(b), which states that “[p]resence of a property not possessed by the prior art is evidence of nonobviousness. *In re Papesch*, 315 F.2d 381, 137 USPQ 43 (CCPA 1963) (rejection of claims to compound structurally similar to the prior art compound was reversed because claimed compound unexpectedly possessed anti-inflammatory properties not possessed by the prior art compound; *Ex parte Thumm*, 132 USPQ 66 (Bd. App. 1961) (Appellant showed that the claimed range of ethylene diamine was effective for the purpose of producing ‘regenerated cellulose consisting substantially entirely of skin’ whereas the prior art warned ‘this compound has ‘practically no effect.’).”

For at least these reasons, Applicants submit that “the water absorbent resin composition contains 95 wt % or more of particles whose particle diameter is less than 850  $\mu\text{m}$  and not less than 106  $\mu\text{m}$ , and a weight average particle diameter of the particles is less than 500  $\mu\text{m}$  and not less than 300  $\mu\text{m}$ , and a logarithmic standard deviation ( $\sigma_z$ ) of a particle size distribution of the water absorbent resin composition is 0.45 or less, and a water-soluble component of the water absorbent composition is 35 wt

% or less” and “an extraction rate of the multivalent metal component around a surface of said particulate water absorbent resin is 10.0 wt % or more and less than 70 wt %” features recited independent claim 1 are not anticipated, or obvious, in view of the absorbent polymer of Mertens.

c. HATSUDA

Hatsuda is directed to a water-absorbent resin powder having high liquid permeability under a load and high water absorbency both under a load and under no load, and a water-absorbent resin powder that has minimal deterioration of its physical properties and increased impact resistance when transported or incorporated into absorbent articles.

Hatsuda fails to even recognize a problem with the moisture absorption blocking property of water-absorbent resins. Therefore, Applicants submit that Hatsuda fails to cure the deficiencies of Mertens with respect to independent claim 1.

As such, Applicants submit that Mertens fails to teach, or suggest, a water absorbent resin composition wherein “the water absorbent resin composition contains 95 wt % or more of particles whose particle diameter is less than 850  $\mu\text{m}$  and not less than 106  $\mu\text{m}$ , and a weight average particle diameter of the particles is less than 500  $\mu\text{m}$  and not less than 300  $\mu\text{m}$ , and a logarithmic standard deviation ( $\sigma_z$ ) of a particle



size distribution of the water absorbent resin composition is 0.45 or less, and a water-soluble component of the water absorbent composition is 35 wt % or less” and “an extraction rate of the multivalent metal component around a surface of said particulate water absorbent resin is 10.0 wt % or more and less than 70 wt %” as recited in independent claim 1.

Accordingly, reconsideration and withdrawal of the rejection to independent claim 1, and claims 2-4 at least by virtue of their dependency on independent claim 1.

ii. INDEPENDENT CLAIM 7

Independent claim 7 is directed to a method for producing a water absorbent resin composition including (*inter alia*) “adding a solution of an aqueous multivalent metal compound (B) to a particulate water absorbent resin (A) with a cross-linked surface” wherein “a concentration of the aqueous multivalent metal compound (B) in the solution is 0.40 or more with respect to a saturated concentration of the aqueous multivalent metal compound (B) in the solution.” Applicants submit that the art cited in the rejection fails to teach, or suggest, the above features recited in independent claim 7.

a. MERTENS

The rejection states that “[g]iven that, it is noted that [the] amount of water is used from 1.0 to 4.0 wt%. Replacing 2.5g of water in example 1 with 1.0 g of water will give a concentration of multivalent

metal compound/component of  $\geq 0.40$  with respect to a saturated concentration of the aqueous multivalent metal compound.” Action, p. 10. That is, the Examiner alleges that it is possible to define the concentration of the multivalent metal component of claim 7 by changing the amount of water in Example 1 of Mertens from “2.5 g with respect to 100 g of the polymer product” to “1.0 g with respect to 100 g of the polymer product.”

However, as stated above, Mertens is silent about the “moisture absorption blocking property” of the absorbent polymer. Further, Mertens does not explicitly teach, or suggest, a preferred concentration for the multivalent metal component. Thus, the concentration of the multivalent metal component can arbitrarily be set from 1 wt% to 100 wt% depending on the amount of water and polyol used.

Thus, Applicants submit that there is no motivation to select a concentration for the multivalent metal compound of Mertens such that “a concentration of the aqueous multivalent metal compound (B) in the solution is 0.40 or more with respect to a saturated concentration of the aqueous multivalent metal compound (B) in the solution” as recited in independent claim 7, absent inappropriate hindsight based on Applicants’ disclosure.

Further, the rejection states that “[w]ith respect to (B) and (E), attention is drawn to instant specification (paragraph bridging pages 59-60) wherein it is noted that mixing the particulate water absorbent resin, the solution of multivalent metal component and organic surface

crosslinking agent is not particularly limited.” Action, p. 9-10. However, Applicants direct the Examiner’s attention to “Embodiment I” of the instant application, in particular page 32, lines 6-8.

The rejection also states that “[e]ven, if it was not the preferred method, Mertens et al teaches that a superabsorber resin is obtained by coating a particulate absorber resin with aqueous solution of a polyol which has reacted with molecular groups near the surface, preferably with carboxyl groups i.e. surface of the resin is in fact coated with organic crosslinking agent.” Action, p. 10.

However, Applicants would like to point out to the Examiner that nothing in column 3, lines 54-60 of Mertens suggests that the particulate absorber resin is cross-linked prior to adding the aqueous solution of a polyol. Furthermore, Mertens teaches that the particulate water absorbent resin is coated “in the presence of cation of the salt component.” Mertens does not teach, or suggest, that “the multivalent metal component aqueous solution is added to the surface cross-linked water absorbent resin” as recited in independent claim 7.

Further, Applicants note that Comparative Example 13 of Mertens uses a secondary surface-crosslinked polyacrylate. Comparing Comparative Example 13 of Mertens and Example 1 of Mertens, Applicants note that the concentration of the multivalent metal in Example 1 is lower than that in Comparative Example 13. Thus, Mertens teaches away from “a concentration of the aqueous multivalent metal compound (B) in the solution is 0.40 or more with respect to a

saturated concentration of the aqueous multivalent metal compound (B) in the solution” as recited in independent claim 7.

Moreover, as noted above, Mertens fails to teach, or suggest, a problem concerning the moisture absorption blocking property.

b. HATSUDA

As discussed above, Hatsuda fails to even recognize a problem with the moisture absorption blocking property of water-absorbent resins. Therefore, Applicants submit that Hatsuda fails to cure the deficiencies of Mertens with respect to independent claim 7.

As such, Applicants submit that Mertens fails to teach, or suggest, a method for producing a water absorbent resin composition including “adding a solution of an aqueous multivalent metal compound (B) to a particulate water absorbent resin (A) with a cross-linked surface” wherein “a concentration of the aqueous multivalent metal compound (B) in the solution is 0.40 or more with respect to a saturated concentration of the aqueous multivalent metal compound (B) in the solution” as recited in independent claim 7.

Accordingly, reconsideration and withdrawal of the rejection to independent claim 7, and claim 10 at least by virtue of its dependency on independent claim 7.

iii. INDEPENDENT CLAIM 8

Independent claim 8 is directed to a method for producing a water absorbent resin composition wherein “a concentration of the multivalent metal component contained in a mixed solution including the solution of the aqueous multivalent metal compound (B) and the organic surface cross-linking agent (C) is at least 1.80 wt %.”

a. MERTENS

For similar reasons as discussed above with regard to the concentration of the multivalent metal component of Mertens, Applicants submit that Mertens also teaches away from “a concentration of the multivalent metal component contained in a mixed solution including the solution of the aqueous multivalent metal compound (B) and the organic surface cross-linking agent (C) is at least 1.80 wt %” as recited in independent claim 8.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejection to independent claim 8, and claims 12-15 and 20 at least by virtue of their dependency on independent claim 8.

iv. INDEPENDENT CLAIM 9

Independent claim 9 is directed to a method for producing a water absorbent resin composition wherein “a concentration of the multivalent metal component contained in a mixed solution including the solution of the

multivalent metal compound (B) and the organic surface cross-linking agent is at least 1.80 wt %." Thus, Applicants submit that independent claim 9 is patentable over the cited art for similar reasons as noted above with respect to independent claim 8.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejection to independent claim 9, and claims 16-19 and 21 at least by virtue of their dependency on independent claim 9.

v. INDEPENDENT CLAIM 23

Independent claim 23 is directed to a water absorbent resin composition wherein "the water absorbent resin composition contains 95 wt % or more of particles whose particle diameter is less than 850  $\mu\text{m}$  and not less than 106  $\mu\text{m}$ , and a weight average particle diameter of the particles is less than 500  $\mu\text{m}$  and not less than 300  $\mu\text{m}$ , and a logarithmic standard deviation ( $\sigma_z$ ) of a particle size distribution of the water absorbent resin composition is 0.45 or less, and a water-soluble component of the water absorbent composition is 35 wt % or less" and "an extraction rate of the multivalent metal component around the surface of said particulate water absorbent resin is 6.6 wt % to 14.8 wt %." Applicants submit that independent claim 23 is patentable over the cited art for similar reasons as given above with respect to independent claim 1.

As such, Applicants respectfully request that the Examiner reconsider and withdraw the rejection to independent claim 23.

(B) *Claims 5-6 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Mertens in view of Hatsuda et al. (hereinafter "Hatsuda"), U.S. Patent No. 6,562,879. Applicants respectfully traverse the rejections.*

Applicants submit that claims 5 and 6 are allowable at least by virtue of their dependency on independent claim 1.

**CONCLUSION**

Accordingly, in view of the above, reconsideration of the rejections and allowance of each of claims 1-10, 12-21 and 23 in connection with the present application is earnestly solicited.

Should there be any matters that need to be resolved in the present application; the Examiner is respectfully requested to contact the undersigned at the telephone number below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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